

IC4.3: Microclimates Exercise Guide

Overview: You have the opportunity to write a quick (one or two page) description of a microclimate in your CWA and describe why this microclimate is important to your forecasts. This will be a “quick and dirty” write-up. If you spend more than an hour or two on this exercise, your scope may be too broad or too detailed. You don't need to do original ground-breaking research--just document what you have already learned from your experience in dealing with the weather in your CWA. You may learn that your subject has been documented in the literature, if so, reference the literature in standard AMS style format. Likewise, you may have a smart tool that you use to forecast the occurrence of the microclimate oriented weather event. Be sure to document your smart tool as well. Should you choose to document a microclimate, you may choose to work as sole author, or include your colleagues as multiple authors. As an example, a brief write-up of the Tanana Valley Jet microclimate in the WFO Fairbanks CWA is included at the end of these instructions.

Motive: Our motive is to document some of the extensive informal knowledge learned on the job concerning microclimates that impact our forecasts—knowledge which until now may not be well known by you or your neighboring offices. Consider as your audience an operational meteorologist who is capable and intelligent, but is simply unfamiliar with the microclimate in question. Consider the point of view of a forecaster who is new to your CWA or perhaps a forecaster at a neighboring WFO who will need to know about your microclimate to back up your forecasts.

Your documented microclimate, upon permission from your AWOC facilitator, will be included in an online site at WDTB for all NWS staff to view. You will be credited for going above and beyond the requirements for finishing the winter AWOC course.

Topic: Coordinate with your AWOC facilitator on your choice of topic. The collective effort at each WFO should be spread out to cover as many topics as possible. To increase the number of possible topics, your SOO or AWOC facilitator may include any phenomena that may require you to issue a warning, especially those that occur in the cool season.

Format: Your AWOC facilitator may require your exercise to conform to a certain format. Aside from any local instructions, the specific format of your document is up to you. In general, some things you may want to include in your document are...

1. A description of the synoptic-scale pattern which “activates” the microclimate.
2. An outline of the impact this microclimate has on your forecasts.
3. Any qualitative “rules of thumb” or quantitative formulas to use in forecasting the sensible weather associated with this microclimate. You should briefly document any smart tools that your office uses.
4. A description of any strengths and weaknesses the NWP models, including MOS, have with regard to this microclimate.

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Please don't feel that you have to follow the exact form of the Tanana Valley Jet example--do what you think is best for your topic. Your write-up could be primarily narrative, or could rely on tables or a bulleted outline. You can include hand-drawn sketches or AWIPS D2D screen captures if you like. In addition to the example Tanana Valley Jet, you may peruse other examples from this lesson page.

Once you have written up a microclimate, ask your facilitator to review it and then e-mail the document to icwinter4@wdtb.noaa.gov and put a subject as IC4 microclimate "Your topic title" and your office ID.

IC4.3: Microclimates Exercise Example: The Tanana Valley Jet

Overview: The Tanana Valley Jet (TVJ) is a winter season wind phenomenon that commonly occurs in zone 223, with particular impact on the community of Delta Junction. The TVJ is a cold katabatic wind blowing down the Tanana Valley from southeast to northwest. The pressure gradient force down the valley is the primary driver of the TVJ.

The TVJ does not occur in the very upper reaches of the Tanana Valley where the valley is quite narrow. The wind only begins once the valley widens out, roughly half way between Northway and Delta. The area covered by the TVJ then extends westward down the valley until the wind dissipates over the Tanana Flats south of Fairbanks and Nenana. The TVJ can sometimes wonder out of the boundary of zone 223 to affect Eielson AFB and Nenana, and but it never impacts Fairbanks. Even if the TVJ does affect Eielson or Nenana, wind speeds in these locations will be less than at Delta. The boundary of zone 223 was drawn with the TVJ in mind. See figure 1 to look at the topography of this area. Figure 2 shows a TVJ event in progress, as evidenced by smeared out appearance of the IR imagery in the windy area, which is contained within AKZ223.

Wind magnitudes of as little as 15 m.p.h. and as much as 60 m.p.h. are possible at Delta with the TVJ, depending on the strength of the PGF, and the wind direction at Delta during a TVJ event is approximately 110 degrees, which is the down-valley direction. Unlike the Chinook wind, which blows into Delta from 180 degrees and brings moderate temperatures, the TVJ is a cold katabatic wind, so wind chills will need to be considered. The synoptic-scale pattern that produces the TVJ is a dry pattern, so the wind with the TVJ is not accompanied by falling snow, and blizzard conditions at Delta will be very unlikely even during a strong TVJ event. A TVJ event can last from a few hours to as long as a few days, depending on the evolution of the synoptic-scale regime.

Synoptic-scale Ingredients: A cold surface high over northwest Canada and/or along the Alcan border is required, along with a surface low somewhere along Alaska's west coast. The idea is to produce a sea level pressure gradient push down the Tanana Valley, with a dome of arctic air over northwest Canada and the eastern interior of Alaska. As long as these conditions persist, the TVJ can persist.

Diagnosis and Prognosis: Experience suggests that a sea level pressure push of around 10mb from Northway to Delta Junction is sufficient to produce gusts of 40 to 50 m.p.h. at Delta.

Unfortunately, there is not a simple one-to-one relationship between the SLP gradient and wind speeds at Delta. It seems that a relatively high SLP gradient is needed to "turn on" the TVJ, but then once the TVJ is established, the SLP gradient can drop below that value at which the event began and yet winds of a similar magnitude will continue. Once the TVJ event has been established, the SLP difference between Northway and Delta may have to drop well below 10mb before occasional gusts of 40 to 50 m.p.h. will cease.

The GFS model: MAV MOS can often do a passable job forecasting the sustained wind speed at Delta during a TVJ event, although you may need to add 10 to 15 m.p.h. to

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account for the higher gusts. The MAV grids are too rough to depict the TVJ itself, but these grids can do a good job of depicting the synoptic-scale regime which activates the TVJ.



Figure 1. The Tanana Valley from Northway to Fairbanks

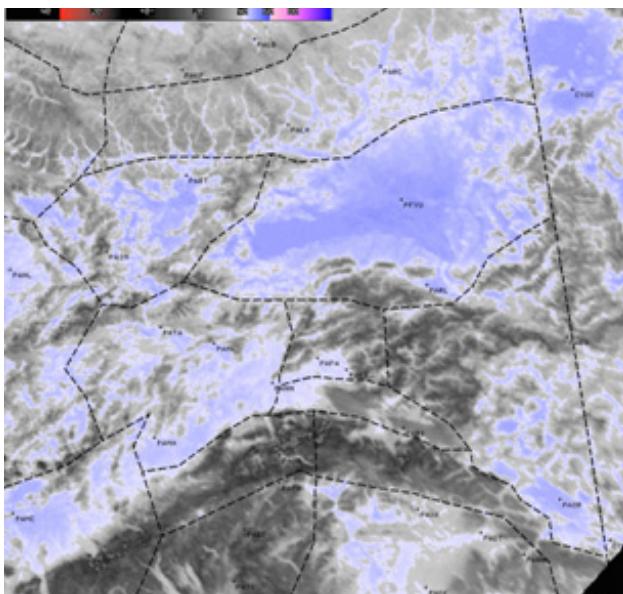


Figure 2. The TVJ mixing the inversion in zone 223